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## CASES OF ANEURISM OCCURRING IN YOUNG PEOPLE.

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THE above will appear a very singular announcement when it is remembered how very rare a lesion this is in the young adult, being nearly altogether absent. Of course, I refer to spontaneous aneurism. The causes that conspire to this condition, or upon which aneurism is supposed universally to depend, are fatty and calcareous degenerations of the arterial coats, thereby enfeebling their resistance to the weight and impulse of the blood. The absence of both of these degenerations in early life is no doubt the true cause of its great exemption from this disease. But cases do occur; and when one of these cases is found, do I consider it as a matter of course that fatty degeneration must necessarily be present in the arterial tunics? On the contrary, I do not believe that it does exist. I think there is a more plausible explanation than this. Old age and youth have each a particular enemy—in the former it is "fatty degeneration," unmistakable announcement of reduced vital energy; in the latter it is "inflammation," the excess of vital action, and this abnormal action can soften and spoil arterial tissues, when they become a victim to it, quite as readily as "fatty degeneration." And will any one deny, when aneurism happens in early life, that it was preceded by inflammation? I am much mistaken if they can. Does not inflammation occur in the arterial tunics? Then if it occurs, is it more difficult to conceive it resulting in interstitial softening of the arterial tissues than of the other multifarious textures and organs throughout the economy? The result of this weakening of the walls of the vessel by inflammation is the same as that which has its origin in fatty degeneration, viz., dilatation, more or less extensive according to the degree of injury—this is aneurism. But I believe, though I have never had the opportunity to establish it by dissections, that there will be almost uniformly found this difference in the character of

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these dilatations. The tunics spoiled by fatty degeneration, or calcareous deposit, have no elasticity, consequently will not stretch or give, but tear. Through this rent the blood is now poured, and you have what is known as a "sacciform" aneurism; whilst in the former, no special coat suffering complete destruction (though inflammatory action may be more intense in one particular tunic than in the other), but still retaining some tone and tenacity, yet not sufficient to fulfil their office, dilates equally before the pressure and impulse of the blood, creating the cylindroid or tubular aneurism. This is the best and most plausible explanation of the formation of tubular or fusiform aneurism that I can offer, and will account, I think, for its occurrence in youth, several cases of which I have myself observed. The histories of these cases I will proceed to give in detail.

March 10, 1859, I was called to Mary S., daughter of a stone-mason, a young woman of 19 summers, above the common size and of robust appearance; accustomed to hard work. She was carrying a bucket of water up the hill to the house in a great hurry—felt something give way within her, attended with considerable pain, and immediately fainted; was then carried to the house, and placed in bed; has been unable to rise since, from a disposition to faint whenever she makes the attempt. Felt a throbbing in her bowels, with some pain, since the fall; seemed anxious about her condition, and felt as if she were on the eve of dying; did not want to be moved or turned in bed, lying very still upon her back. Said she had felt perfectly well just before the accident.

On examination, I found her with an ordinary, and, as I believed, a natural pulse. The idea of the formation of aneurism occurred to my mind, but she was so young that I thought it impossible, or a circumstance so improbable as to make it unworthy of serious attention. She would not let me press her abdomen (which was very full and rotund) to any extent, desiring me to wait till the next day.

The secretions were normal, and I found nothing in her general condition to give her symptoms importance, or dignify them with danger; and I readily believed she had had some hysterical seizure, from which she had not yet fully recovered. A saline purgative, with a drachm of tinct. valerian, was now ordered her.

On the next day, the medicine not having operated, the dose was repeated. General condition the same. 12th.—The medicine had operated finely, but there was no improvement. I now determined on a critical and thorough examination of the abdominal viscera by palpation. "Don't, Doctor, you hurt me, indeed you do; don't—don't—I feel sick and faint." Thus she remonstrated, though I was conducting my examination as gently as possible. I felt a trembling, undulating, pulsatile movement, and using more force in the vicinity of the umbilicus, my hand was now carried back towards the spinal column, when it was presently arrested by a powerfully pulsating tumor, whose character could not be mistaken, and which I ascer-

tained to be the descending aorta, very much enlarged. This manipulation caused her great distress, and on her crying out with a sudden pang, I desisted.

Auscultation developed aneurismal murmur loud and coarse along the entire track of the abdominal aorta. In a few days I ordered Dr. Hugh Maguire, surgical professor at Winchester Medical College, to be sent for, and we saw the case together.

In the course of several months she had lost considerable flesh, so that the abdominal parietes had retreated back upon the vertebral column in close proximity to the aneurismal tumor, whose pulsations, synchronous with the contractions of the left ventricle, could now be distinctly seen at a considerable distance. Its form, size and character were also clearly appreciable. Beginning at the bifurcation of the common iliac, it extended up to the vicinity of the coeliac axis—a uniform, general dilatation of the arterial tube, approximating an inch and a half in diameter, perhaps something more. At one or two points its surface was a little undulating. She had become so extremely impressive to sound and motion as to suffer great pain whenever a heavy foot or a full voice entered her apartment. With this condition there was a constant sense of impending death, so that she would not remain alone even for an instant. Nor could she be induced to make the slightest physical effort, maintaining a constant recumbency, not allowing so much as a pillow under her head, on the ground that it always made her feel worse. It was with the greatest difficulty and at long intervals that she would allow her bedding to be changed, which required the assistance of four or five persons.

Eighteen months later, I saw her again. I found her in the identical position in which I had left her, flat on her back. Her mother informed me that she had had an extensive abscess in her lumbar region some months previously, but was now well of it. She had gained some flesh, and was looking a great deal better than when I had last seen her. Her natural functions appeared to be good, but the tumor had not altered in the least, that I could detect. I have no doubt that there was some erosion of the spine. Said she had not lost sensation nor motion of legs, nor of any region of her body—"that she would try to sit up, but that when she only raised her head a little it beat and hammered so in her bowels that it would make her feel faint and sick, and compel her to lie down again."

It is now nearly six years since the accident; and when last heard from, she was continuing in the same condition.

In the fall of 1860, whilst I was on a visit to Harrisonburg, Va., I was called to see the daughter of a minister—a most remarkable case, and one of great notoriety. She was a most lovely creature—of full size, symmetrical form, black hair and eyes, a high commanding forehead, and a Grecian style of face, the features wearing an expression at once dignified, lofty and commanding, revealing a vim

of mind and intellectual power that gave the lie to all suspicions of hysterical chicanery. But in this particular, I must confess that I am a little sceptical of all women; and remembering the injunctions of Sir Benjamin Brodie and a little experience of my own, I proceeded to a thorough search of her organs on the principle of exclusion. She informed me that she had been a wild, romping girl, and as healthy as one could be, but that one day, when she was 13 years old, she attempted to carry a small tub of water containing her linen collars to another quarter of the room, when she felt a terrible pain in her stomach that made her cry out and let the tub fall. She was assisted to bed, and had been an invalid ever since. She was now 24 years of age. Said she "could sit up, also walk a little, but that it gave her such pains in her back and stomach, and it throbbed and beat so inside of her, that she had immediately to lie down again." "That she felt best when she was propped up in bed, or lying down." I found nothing wrong with this woman's intellect or brain, or spinal marrow, or heart, or lungs, or womb, or kidneys, or any of her organs, till at last forcing my fingers back upon the descending aorta, I discovered it pulsating violently; and yet it might be only a "pulsating aorta"; so following this train of thought, I began to carry my fingers a little higher up, when I suddenly encountered a fusiform expansion, which I ascertained to be about 4 inches in length and  $2\frac{1}{2}$  in breadth. It appeared to be an anterior lateral protrusion, and fuller on the left than on the right aspect of the artery. She had never suffered from abscess in this locality. The aneurismal murmur was softer and lower than in the first case, but still very distinct.

Some years ago, I was called to a young man, 18 years of age, by the name of Windle. He had been engaged in building a shed, when suddenly becoming sick, he went to the house and lay down. Three days after this occurrence I saw him. He then was complaining of a bad feeling in his chest, pain between his shoulders, and constant nausea, with uneasy sensations in his bowels. Said that "he had not felt well for several months, and that he was rapidly getting in such a condition that he could hardly do anything without feeling badly afterward." His pulse was excited; and placing my hand over his heart, I felt a peculiar thrill or trembling sensation; and on applying my ear I heard a whirring, purring, double murmur, which increased in intensity as I approached the hypochondrium, where it was exceedingly distinct, and the parts could be seen strongly pulsating synchronous with the movements of the heart. I made an effort to press back the epigaster, but he caught my hand and would not permit it, saying "it hurt him too badly." He had never suffered from inflammatory rheumatism, nor labored under acute pain directly over his heart.

One morning, several months later, he was found dead in his bed, and was buried before I had learned of his demise, or I would have



made a *post-mortem* examination. I firmly believe that he had aneurism, and that it burst and killed him.

February 28th, 1865.

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DR. A. R. BECKER'S PRIZE ESSAY ON GUN-SHOT WOUNDS.

[Concluded from page 100.]

CHAPTER V.

*Compound Fractures of the Extremities, Amputations, &c.*

GUN-SHOT fractures of the femur are of very frequent occurrence in battle, and are remarkably dangerous, as compared to fractures, not compound, of the same bone, such as are met with in civil practice. "All the complete fractures of the other bones of the extremities unite, when well managed; by what fatality are those of the femur not equally fortunate? Is it the diameter of the cavity of the bone; the quantity of medullary substance which it contains; the peculiar structure of the vessels which carry the nourishment; the size and force of the muscles which are attached to it, which by their weight and pressure obstruct the passage of the liquids? All these causes united, may combine together and give rise to that want of success which we meet with in treating complete fractures of the femur caused by firearms; but complete fractures of this bone heal very well, whatever cause has produced them, when they are not accompanied by a wound."—(Ravanton, *Chir. d'Armée*, p. 324.)

All the dangerous characteristics of gun-shot fractures have been greatly increased by the conical ball. 1st. The shock it occasions is far greater than that caused by the round ball, merely because the destruction resulting therefrom is much more severe. 2d. The comminution of bone is enormously increased. 3d. The bruising of the soft parts is more extensive; consequently the suppuration is more prolonged, and the chances of purulent absorption so much increased.

There has been a great cry throughout the profession, of late years, for conservative surgery; and this is just and right, and has undoubtedly done much good. But there are many concomitant circumstances in the military practice of surgery which force us to amputate, when in civil practice we might save the limb. And this is especially true in gun-shot wounds of the femur. In the first place, the standard of health and strength is much reduced in those who have for any length of time been subjected to the privations and hardships of campaign life; they live so completely up to their income of health—so to speak—that when any additional drain is made on the system, by a wound or sickness, their strength fails very rapidly. And, in the second place, it is essential to the successful treatment of compound fractures that the patient be sup-

plied with suitable food; that his broken limb be retained, for a certain length of time, immovably fixed in a proper apparatus, and that careful treatment should be continued for a length of time. But how can these things be accomplished in war? Field-hospitals are not overflowing with comforts and conveniences, and the transportation to a general Hospital is often long and tedious—never more so than in the present war. "Thus we foresee," says John Bell, "an argument of necessity, as well as of choice, and that limbs which in happier circumstances might have been preserved, must often in a flying army or dangerous campaign be cut off. It is less dreadful to be dragged along with a neat amputated stump, than with a swollen and fractured limb where the arteries are in constant danger from the splintered bones; and where by the least rude touch of a splinter against some great artery the patient may in a moment lose his life." And Dupuytren says, in one of his clinical lessons, "I have repeated it often, and I repeat it for the last time, after the facts which I have observed, chiefly in 1814, 1815, and 1830, that my opinion on this point is unshaken. In compound fractures from gun-shot, in rejecting amputation, *we lose more lives than we save limbs.*"

According to Macleod, the lower extremity was removed at the *hip* ten times during the Crimean War, in the English army, all primary operations, and all ending rapidly in death. The same author says, "Although making every endeavor, I have only been able to find a record of three cases in which recovery followed a compound fracture in the upper third of the femur, without amputation. . . . I am certain, however, that although the instances of recoveries were rare, they were yet not so exceptional as recoveries after amputation of the same part. . . . After the 1st April, 1855, amputation in the upper third of the thigh was performed 39 times, with a fatal result in 34 cases. Of the total number only one was a secondary operation, and it ended fatally. . . . Amputation in the middle third was performed, during the period after the 1st April, 1855, 65 times, of which 38 died; 56 of these cases, and 31 deaths, were primary operations; 9 cases were operated on at a later period, and 7 died. Amputation was performed on the lower third, during the same period, 60 times, 46 being primary and 14 secondary operations; of the primary, 23 died; and of the secondary, 10." Thus we have 174 amputations in all parts of the thigh, and 115 deaths. It would appear, then, that in gun-shot fractures of the upper third of the femur we should try to *save* the limb; but in a like injury of the middle and lower thirds, primary amputation will be our best course.

As a general rule, I think the circular operation will be found the best in amputations of the thigh; 1st, because by this operation we can remove the limb further from the trunk than by the flap operation; and, 2d, because in transportation we escape the knocking about

and consequent loosening of the heavy flaps, which so frequently occur after the last-named method.

Gun-shot wounds of the leg, fracturing both bones, will generally require amputation; and the sooner it is performed the better. The statistics of the Crimean War, after April 1st, 1855, give 101 amputations of the leg, and 36 deaths resulting therefrom; 89 cases and 28 deaths were primary operations; and 12 cases and 8 deaths, secondary.—(Macleod.)

Where one bone only is fractured, the limb should be saved, even if that one be considerably destroyed, as the other will serve to steady it during the repairing process. When the fracture occurs near the ankle the injury is more severe than when it takes place near the middle of the bone. Resections may sometimes be performed on one or other of the bones of the leg to advantage.

Compound fractures of the upper extremity are not, as a rule, so dangerous as those of the lower, and much greater success will be met with in their treatment. Several causes combine to produce this result, among which the following may be named—the free anastomosis which exists between the vessels, the large supply of blood which they convey, the smaller amount of suppuration, and the less necessity for the patient to keep in a constrained position during recovery.

In the Crimea, after the 1st April, 1855, amputation at the shoulder was performed 39 times, with 13 deaths: 33 cases and 9 deaths were primary operations, and 6 cases and 4 deaths were secondary. Amputation of the upper arm was performed, during the same period, 102 times, with 25 deaths; 96 cases and 22 deaths were primary, and 6 cases and 3 deaths were secondary. The forearm was amputated, during the same time, 59 times, with three deaths; 52 cases and 1 death were primary, and 7 cases and 2 deaths secondary.—(Macleod.) Thus we have 200 amputations of the upper extremity, with 41 deaths.

Resections are particularly applicable to the upper extremity, the arm retaining its full power of motion in many ways, and increasing in power and usefulness with practice.

Wounds of the foot and hand, even of the most severe character, frequently make very good recoveries; and this result should always be aimed at. Even if partial amputation be necessary, we can often contrive to leave the patient a very useful remnant.

The special methods of amputation, and of the treatment of compound fractures, when we try to save a limb, do not require any particular mention in an essay of this size and character.

## CHAPTER VI.

### *Wounds of Joints; Excision of Joints, &c.*

The gravity of gun-shot wounds of the joints depends chiefly on the size and construction of the joint, the extent of the injury, and

the conveniences for careful treatment which may be at hand. The wound of a ginglymoid articulation is generally more severe in its consequences than that of a ball-and-socket joint—principally on account of its more complicated structure. Larrey makes mention of the frequency of tetanus as a consequence of wounds of these joints.

Even when there has been a very great amount of destruction of the articulating extremities of bones, the external wound and appearance may be so trivial as to deceive us in regard to the nature of the wound, and often induce us to delay the prompt and decided measures which are so necessary to ensure recovery.

The hip-joint is so deeply placed, and so much protected by the surrounding parts and its own form, that it is not often penetrated by a ball; but when this does occur the destruction is usually very serious. Alcock lost three out of four cases in which this accident occurred; and in the fourth case, "where recovery took place, the joint itself, there is some reason to suspect, was but remotely affected."

A round ball may occasionally become impacted in the head of the femur, with or without a partial fracture of its neck. It is very difficult, however, to recognize such injuries at first, as there may be neither displacement nor crepitation perceptible. Larrey mentions the case of an officer, wounded in Egypt, who received a ball in the neck of the femur. The wound closed, and twenty years afterwards, on the death of the patient from disease of the chest, the ball was found impacted in the bone.

A penetrating wound of the knee presents an injury of the very gravest description. Macleod says, in referring to wounds of this joint, "I can aver that I have never met with one instance of recovery in which the joint was distinctly opened, and the bones forming it much injured by a ball, unless the limb was removed." A round ball will sometimes penetrate the lower end of the femur, or head of the tibia, without opening the joint, or at least with very slight injury to the capsule, and these cases may recover; moreover, balls may pass close to the capsule, and yet do it no harm, and it is such cases as these which are frequently recorded as recoveries from penetrating wounds of the joint. It is, undoubtedly, often very difficult to determine whether the joint be opened or not, particularly if the ball be a small one. It often happens that the round ball will course around the bones superficially, when it appears to have passed directly through the articulation. We should remember, also, that the swelling of the joint may be caused merely by a bruise, or by the extension of inflammation from some neighboring injury.

When the bones are not much injured a considerable length of time may intervene before severe symptoms set in; and this again may tend to deceive us in regard to the real nature of the injury.

Joint wounds from conical balls, however, are not apt to leave

us in much doubt. They generally crash into and through whatever comes in their way, leaving very distinct marks of their progress.

The danger of these wounds is not immediate, but lies in the long wasting suppuration, the dangerous abscesses which burrow far into the neighboring tissues, and the manifold chances of pyæmia. These abscesses appear among the muscles of the thigh, frequently burrowing along the bone, and stripping it of its covering, and yet are seldom—so far as we can see—in connection with the joints. They are often unnoticed for a long time, and give rise to a great deal of trouble and danger. At a late period of the case, the joint puts on all the appearance of white swelling.

Military surgeons have always acknowledged the necessity of early amputation, where the articulating ends of bones have been fractured by a ball. Esmarch, from the field of Schleswig-Holstein, says, "All gun-shot injuries of the knee-joint, in which the epiphysis of the femur or tibia has been affected, demand immediate amputation of the thigh. It is a rule of deplorable necessity, already given by the best authorities, and which our experience fully confirms." Guthrie has seen no case recover in which the limb was not removed.

Macleod says: "I have often contemplated the laying of the articulation freely open, at an early period in these cases, so as to permit of the extraction of all foreign bodies, and the free escape of the pus which must afterwards be formed, the retention of which is undoubtedly one great source of danger. This might be attempted, even although it were necessary to lay the whole front of the joint open, by an incision similar to that for excision. The joint has been frequently widely laid open by cutting instruments, both primarily, and for disease, and most satisfactory results have been obtained. [Note.—At the time the above was written, I had not seen Stromeyer's book, and did not know that the same idea had occurred to him, or that in the only case in which he had practised it, the results had been most encouraging.]"

In July, 1864, while at Hampton Hospital, Va., a case came under my care in which there had been an apparently slight shell wound of the outer side of the left knee. The wound was small and the joint not opened. About two weeks after the receipt of the wound, however, it was found that pus had burrowed into the joint. My own strong desire was to amputate immediately; but upon calling a consultation I was over-ruled, and it was determined—the patient being young and very healthy and robust—to try to save the limb according to Stromeyer's and Macleod's suggestion of laying open the joint. This was done by a free incision on each side of the patella—the limb hung in Smith's anterior splint, and everything done to improve his general condition. The patient did very well until about the eighth day; he then sank very rapidly, and died on the tenth day after the joint was opened.

No better or fairer case could be selected upon which to try this

plan of treatment; but it failed most lamentably, and only served to give more force to the rule that where the knee-joint is opened by a gun-shot wound, either directly or by ulceration, the limb should be immediately amputated. If you wait and hope, your patient does well for a little while, and then sinks with such fearful rapidity that no power or science on earth can save him.

If we decide to make the attempt to save the limb, the most rigid antiphlogistic treatment should be enforced; as well as the early evacuation, by free incision, of abscesses, and of matter if it form within the joint. Hectic, with its common accompaniment—diarrhoea—pyæmia and tetanus, are the causes which generally bring death to the relief of the sufferer.

If amputation be decided on, the sooner it is performed the better; for if the operation be deferred, until inflammation and suppuration have been for some time present, the results are very unfavorable.

Shell wounds of the knee are not usually so dangerous as bullet wounds. They frequently merely cut the soft parts open; or, if they injure the bone, they leave a larger aperture, by which the secretions can be more freely discharged. These wounds frequently recover well, with more or less ankylosis.

Macleod has seen only one gun-shot fracture of the patella. The bone was "starred," but the ball did not lodge. The recovery was good, "the motion of the joint being, however, considerably interfered with."

Penetrating wounds of the ankle will generally do well if properly treated, but they require much and long-continued attention. Two things are especially required: 1st, that the articulation be rendered perfectly immovable; and, 2d, that one or other of the wounds be so enlarged as to allow of the free escape of all discharges.

The shoulder-joint, from its more simple mechanism, will, as a rule, suffer less, and from its superficial position will be more manageable when injured than almost any other articulation. Balls sometimes pass very close to the capsule without opening it, or with very slight injury. Larrey tells us that he saved many cases, in which the opening into the joint was not great. If a ball remains impacted in the head of the bone, as sometimes happens with the round ball, it should be removed as soon as possible; as, otherwise, caries of the bone and disease of the joint will be the probable result. Abscesses and fistulous tracks are the concomitants most to be dreaded in penetrating wounds of the shoulder-joint.

Wounds of the elbow are more dangerous than those of the shoulder, on account of the more complex nature of the joint. Excision will be found the best and most satisfactory method of treatment.

We now come to speak of Excision of Joints—a subject very in-

teresting to the military surgeon, on account of the great number of cases in which it can, with propriety, be substituted for amputation; and even, in some instances, holding out a far better hope than the last-named operation.

In the Crimean war, after the 1st April, 1855, excision was performed on

Head of the femur . . . . .	5, primary, of which 1 recovered.
" " " . . . . .	1, secondary, fatal.
Knee-joint . . . . .	1, " "
Os calcis and part of astragalus . . . . .	1, recovered.
Os calcis alone . . . . .	1, " "
Head of humerus . . . . .	8, primary, 1 death.
" " " . . . . .	5, secondary, no death.
Do. and part of scapula . . . . .	1, " fatal.
Elbow-joint, . . . . .	13, primary, 3 deaths.
" " partial . . . . .	3, no death. (Macleod.)

The same author says: "The shafts of the bones leading from the joints were often too extensively destroyed to enable the injured parts to be removed by excision; in fact, the shafts were so often split, and their periosteal and medullary membranes destroyed, that the resection of the articulation did not suffice to save the limb. Surgeons soon recognized this; but yet it was by no means always easy to determine the true state of things about the joint till the incisions necessary for resection laid bare the bones, and forced the reluctant operator to convert his operation into one of amputation."

Primary excisions will be found much more successful than the secondary, both as regards the final results, and the length of the period of convalescence. Very much depends on the after-treatment; especially in guarding against inflammation.

The shoulder-joint is certainly that to which excision is the most applicable; both from its simple construction, its superficial position, and from the greater readiness (on account of the great vascularity of the surrounding tissues) with which the reparative process is here accomplished.

Guthrie thought the insertion of the deltoid the lowest point at which the bone could be divided, with any prospect of success. But Esmarch has shown, that as much as four and a half inches may be removed from the humerus, and yet a very useful arm remain. Of this fact I know several instances resulting from the present war. Moreover, the report of Esmarch on the practice of Stromeyer and Franke shows us, that to cut across the fibres of the deltoid does not much interfere with its after usefulness; "as its upper edge applied itself to and united with the articular surface of the scapula, and was thus fully attached, and able to raise the arm. The healing was also quicker, as the space to be filled by granulation was much diminished in size, by the application of the muscle to the glenoid fossa."



The fact so clearly demonstrated by Stromeyer, should always be borne in mind when determining on operations at the shoulder-joint; that in comminution of the shaft of a long bone, the fissures never extend into the epiphysis; in the same manner, injuries of the epiphysis, only in very rare cases, extend into the shaft, unless the bullet strikes the adjoining borders of both parts.

It will be found, that in the field we do not require such extensive incisions as in civil practice; and thus, of course, the hope of restored action will be much increased.

One of the chief dangers resulting from excision of the shoulder, lies in the formation of abscesses and sinuses in the neighborhood. To avoid this, we should arrange the line of incision so as to give free exit to the pus; and with this object in view, we shall find Stromeyer's semicircular incision over the posterior surface of the articulation better than any other.

Resection of the elbow has long been known to be far less fatal than amputation. The question now is, how much of the articulating ends of the bones can be removed, consistently with retaining a useful joint? Esmarch thinks that "the less there is removed from the joint ends of the bones, the greater is the probability of ankylosis." But there is considerable diversity of opinion, as to the greatest amount of bone which should be removed.

The complete fixture of the joint during the earlier period of treatment, which is so emphatically dwelt on by Stromeyer; its constant support by a splint, even when being dressed; the elevation of it, to prevent œdema, and its flexure at an angle of  $130^{\circ}$  to  $140^{\circ}$ , are all points of great importance. Before the wound has wholly cicatrized, passive motion should be attempted; but it must be at once abandoned, if any irritation or sign of inflammation makes its appearance.

Macleod tells us, that so far as he knows, the knee was only excised once in the Crimea, and that patient died from causes unconnected with his wound. Mr. Ferguson thus sums up the advantages which his large experience ascribes to the operation:—"The wound is less than in amputation of the thigh, the bleeding seldom requires more than one or two ligatures, the loss of substance is less, and probably, on that account, there is less shock to the system; the chances of secondary hæmorrhage are scarcely worth notice, as the main artery is left untouched; there is, in short, nothing in the after-consequences more likely to endanger the patient's safety, than after amputation, whilst the prospect of retaining a useful and substantial limb should encourage both patient and surgeon to this practice."

Resection of the hip, though rather a hopeless operation, is still far more hopeful than exarticulation. Thus we see from the returns of the Crimean war—of ten cases of amputation, all died; while in six cases of excision, one recovered. The great danger of these operations lies in the after-treatment. As in all other excisions of

joints, it is very necessary to keep the joint immovable during the early period of treatment, to provide free exit for the pus, which is sure to make its appearance from abscesses and sinuses in the muscles of the thigh, and to guard against inflammation.

I am fully aware that field-hospitals do not contain all the conveniences for treating these cases; but in very many cases, excision gives us a better chance of saving life, than we can hope for from amputation, besides rendering the life, thus saved, very much more comfortable to the patient. And that the life and permanent welfare and comfort of our patients is the principal object of our profession, no one will deny.

#### ACTION OF WATER ON LEAD.

UNTIL recently the popular creed, professional as well as public, on this subject has been that—

1. Pure or soft waters alone act on lead, and do so in proportion to their purity or softness.

2. A minute proportion of certain neutral salts in water prevents its action on lead.

3. Hence hard or impure waters do not act on lead, and may be safely stored in leaden cisterns and conveyed through leaden pipes.

In 1858, however, Dr. Lander Lindsay, of Perth, laid before the British Association the records of a series of experiments and observations made by himself on this important subject during the previous year. His main or general results were tabulated in the following series of propositions, viz., that—

1. Under certain circumstances pure or soft waters *do not* act on lead.

This was well illustrated by the results of the inquiry instituted in 1854–5 by the Town Council of Glasgow, in connection with the proposed water supply to that city from Loch Katrine. This inquiry cost £5000, and was of the most extensive kind and exhaustive character. It proved *inter alia* that Loch Katrine and other equally pure or soft waters (containing under 2 or 2½ grs. per gallon of solid matter, with a hardness of 0.6 to 0.8 of Clarke's scale) exerted, under given circumstances, no deleterious action on lead.

2. Hard or impure waters, sometimes containing abundance of the very salts which are generally supposed to be most preservative or protective, *do act* on lead, and with the same rapidity and efficiency as pure or soft waters. This was illustrated by the destruction of lead cisterns, through the erosive action of hard water, in the Murray Royal Institution (an hospital or retreat for the insane of the middle classes), near Perth, of which Dr. Lindsay is the physician. This early destruction of lead first directed his attention to the subject.

3. We are in possession of no satisfactory information anent the

causes of the varying action, under different circumstances, of waters on lead; information, that is, which is of any practical use in assisting either in predicating or preventing lead-erosion or lead contamination.

4. *Experimentation on the small scale*, and for short periods, is most fallacious, and frequently dangerous in regard to the practical conclusions thence to be drawn.

5. Contamination of water, both hard and soft, impure and pure, by lead is, in all parts of the kingdom, and under every variety of circumstances, the cause or source of various obscure diseases of man (and also, doubtless, of the lower animals), of the nature especially of dyspepsia and colic. This proposition was abundantly proved by cases of minor diseases induced by lead-contamination of various of the hard or impure waters of London.

6. So uncertain is the action of water on lead, so impossible is it to predicate the nature or extent of that action under the varying mechanical and chemical conditions of water supply of houses and towns, so difficult is it to prevent the possible dangers, so numerous and excellent are the substitutes that may be provided for lead in the construction of cisterns and pipes, that it is desirable henceforth to abolish the use of lead as a material for the conveyance or storage of water.

This *practical* proposition, to which all the others converge or lead, is now being adopted and acted upon by all our most competent and eminent authorities.

The Royal Victoria Military Hospital at Netley, which ought to be the embodiment of all modern progress and discovery in sanitary science and hygiene in their applications to the construction of human dwellings, uses *no lead* in its water cisterns or pipes. A writer in *Good Words* says of this hospital: "The *water supply* has been carefully attended to, and to prevent the possibility of patients suffering from *lead-contamination*, not an atom of that metal has been used in the construction either of the pipes or cisterns. The former are made of block *tin*, and cost £9000. It would be well for the health of the community if in our private houses similar precautions were used.

The Commissioners in Lunacy for Scotland in their regulations anent construction of lunatic asylums, remark in regard to water supply: "It is of the utmost importance that there should be a constant and ample supply of *good water*, of which a *careful analysis* should be made, with a view to determine the proper materials for pipes and reservoirs, and also in order to ascertain its fitness for the purposes of drinking and washing." The reporters add: "*Lead is an objectionable material for pipes and reservoirs as adulterating the water.*" Dr. Hassall, the "Analytical Commissioner" of the *Lancet*, and the author of the well-known standard work on "Food and its Adulterations," says: "From the number of samples of water I have received containing lead, I am induced to believe that that metal is

more frequently introduced into the system in this way than is commonly suspected. Indeed, so many well-ascertained cases of *lead poisoning*, arising from the use of water contaminated with it, have occurred, that I am of opinion that the *use of lead for the storage and conveyance of water ought to be entirely discarded*, especially in the cases of small towns and single houses."

Again, the late Dr. Dundas Thomson, President of the Metropolitan Association of Medical Officers of Health, who had for many years given, as a chemist, great attention to the subject of water supply, and than whom, on such a subject, there are no more competent authorities, remarks: "*It is impossible too strongly to condemn the use of lead pipes and cisterns. They should never be used for conducting and retaining water for drinking and culinary purposes. It is difficult to understand the origin of the employment of a poisonous metal for domestic use. But its disuse must depend upon the substitution of the builder or iron pipe fitter for the plumber, who has too long monopolized the manufacture of this noxious form of cistern.*"

The Americans apparently attribute a greater value to this subject than we do, having devoted a goodly volume to the now bulky evidence *pro* and *con*.

In 1859-60 the great lead and water question was the subject of much public discussion in the columns of the *Times*. The result was a general feeling that the public safety lay in the *abolition of lead in the construction of cisterns and pipes for water supply*—some writers going so far as to recommend a *prohibition by Government* of such use of lead.—*Med. Times and Gazette*.

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## THE BOSTON MEDICAL AND SURGICAL JOURNAL.

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BOSTON: THURSDAY, MARCH 9, 1865.

**THREE MORE DEATHS FROM CHLOROFORM.**—In the *Medical Times and Gazette* of January 7th we find two more deaths from the use of chloroform reported, although special precautions were taken in administering it. The cases are published by Mr. J. Usher Huxley, House-surgeon to the Devon and Exeter Hospital. We copy the first in full, as follows:—

"W. L., a healthy-looking young man, aged 24, was admitted into the Devon and Exeter Hospital on Sept. 26th, suffering from a severe injury to the right foot. A heavy piece of timber falling on it had fractured the metacarpal bone of the great toe, and deeply lacerated the structures of the inner side and sole. The case went on well, and after the separation of some rather extensive sloughs, healthy granulations filled up the greater part of the chasm. The distal end of the fractured metacarpal bone, however, though evidently dead, remained fixed, and considerably hindered the progress of the wound. The man

was therefore told that he must either be contented to remain in bed several weeks longer while the bone spontaneously separated, or must submit to a slight operation for its removal. He chose the latter, on condition that he might have chloroform. The heart was examined, and nothing being found to contra-indicate the employment of an anæsthetic, his wish was acceded to.

"On November 1, at 10, A.M., the patient was carried to the operating-room. Two of the Hospital surgeons and the House-surgeon were present: three pupils and two nurses were also in attendance. Forty minims (measured) of chloroform were placed in a Snow's portable inhaler, and the inhalation was commenced, the external valve being at first turned aside and afterwards gradually closed. The man breathed calmly and showed no symptoms of annoyance or distress, and in about a minute began to smile, talk, and move his head slightly. The pulse, which was kept throughout, beat quite steadily for from two to three minutes, when it suddenly became imperceptible; there was no congestion or other change of the countenance, the pupils were not dilated, and the breathing was as yet quite natural; the inhaler, to which no fresh charge of chloroform had been added, was, however, immediately removed. In the course of a few seconds the respiration became deep and sobbing, and the tongue was protruded between the teeth; no return of the pulse could be felt. The only approach to spasm or convulsion was that for a few seconds the teeth were firmly clenched; this quickly passed off, and the tongue was again protruded. The time during which the respirations continued, unaided, after the pulse had ceased, may be put down at fully a minute, and not until still later did the face become congested or the pupils dilate.

"The cold douche, ammonia, brandy, galvanism, and forceps for the tongue (as always at this Hospital) were at hand in the operating room. The first was applied directly the pulse was missed, and in the shortest possible space of time brandy was injected into the rectum, solution of ammonia on lint was applied to the nostrils, and galvanic shocks were passed (with due intermission) through the cardiac region, whilst friction was applied to the extremities. The forceps were not needed, as the tongue did not fall back.

"Immediately the breathing began to flag, artificial respiration by the 'Sylvester method' was commenced, and this was steadily carried on for upwards of half an hour. The galvanism was applied at intervals for a like period. No trace of reaction occurred. It should be stated that the inhaler had not been used for any other case that morning, so that it contained absolutely no chloroform but the forty minims.

"*Autopsy six hours after death.*—Body muscular, well nourished. Thorax.—Pericardium natural; surfaces of right pleura everywhere firmly adherent; both lungs healthy in structure, the right more congested than the left. On removing the heart (all its orifices having been previously secured), the ventricles were found firmly contracted and empty; the auricles contained some blood, the right in larger proportion. In these and in the large veins the blood was mostly, but not wholly, uncoagulated. All the valves of the heart were perfectly healthy. The muscular substance was firm, of good color, and without the slightest appearance of fatty or other degeneration. On mi-

crosscopical examination, the ultimate fibres were found free from oil-globules, and the striæ were well marked. The walls of the left ventricle were slightly hypertrophied without dilatation. The whole organ, washed free from blood, but with a portion of the large vessels adhering, weighed  $14\frac{1}{2}$  ounces. Aorta healthy; no appearance of clots in the pulmonary artery. Abdomen.—Stomach moderately filled with food. Spleen natural; weight 11 ozs. Liver large, congested; weight 5 lbs. 12 ozs. Kidneys, large and much congested; weight—the right,  $9\frac{1}{2}$  ozs., the left,  $9\frac{3}{4}$  ozs. Both liver and kidneys were firm to the knife, and the surface of the sections looked smooth and rather glistening, so that there was a question as to albumenoid (amyloid) degeneration; but there was no semi-transparent, glue-infiltrated appearance of the cut surfaces and edges, and no reaction, characteristic of amyloid change, took place when solution of iodine was applied. Under the microscope, too, both the arteries and cells of the hepatic and renal structures appeared perfectly natural. After being allowed to remain for some hours (covered over to prevent evaporation), it was found that a quantity of blood had drained from the cut surfaces, and that the liver had assumed the ordinary size, while the kidneys were much reduced in bulk. Sections now freshly made showed perfectly natural surfaces. Head (examined last).—The brain and its membranes were perfectly healthy, and not at all congested; blood, however, had probably drained away from the divided veins of the neck. Some urine drawn off from the bladder after the examination contained a trace of albumen, and a flocculent deposit consisting solely of epithelium.

“At the inquest held on this case the jury returned a verdict of ‘Homicide by misadventure,’ and wholly exculpated the medical officers from blame in the matter.”

This case we look upon as of the greatest value in its bearing on the question of the possibility of employing chloroform as an anæsthetic without danger. It could have been hardly possible to take greater precautions in administering it, or to use more faithfully all the means likely to have had any efficacy in the endeavor to rescue the patient from his perilous situation; and yet death followed. The eyes of the profession in Great Britain have been gradually opening to the alarming risk inseparable from the ordinary methods of inhaling this anæsthetic, and the recent report of the chloroform committee will undoubtedly have a good effect in checking its heedless employment, and in inducing greater watchfulness in those who are willing to deal with such a fatal agent. A new inhaler has been recommended, by which a proper dilution of the vapor with fresh air is secured, and the pulse is entrusted to a special guardian during the whole process of inhalation. With such precautions it is thought this anæsthetic may be disarmed of all its dangers. Now let us look at the case before us.

First, the patient was a young, healthy subject, presenting no constitutional contra-indication, so far as could be discovered, to the use of an anæsthetic. Second, the amount of chloroform inhaled was small—only forty minims—and given with great caution from an inhaler, with a due admixture of air with the vapor. Third, the pulse was watched from the first. And yet, without the slightest warning, without any evidence of distress or of cerebral oppression, without



any faltering or weakness of the pulse to give the alarm, it instantly stopped, and did not return. Surely one who is accustomed to employ this agent may well be appalled by such an unlooked-for casualty. Every known precaution taken, a fit subject for the inhalation, instant death without warning!

The case, as we have seen, is most carefully reported. The results of the autopsy are most interesting. It will be observed that the heart, *ultimum moriens* as it has been called, was found "firmly contracted and empty." This condition is very significant when considered in relation to the usually accepted explanation of chloroform deaths. Paralysis of the heart is the commonly received cause of death in these cases. The agent is thought to act with fatal rapidity by destroying the sensibility of this vital centre and thus arresting its action. It is a pretty important matter to determine whether this is the true explanation of these terrible calamities, since upon it depends the theory of treatment. It would seem, in the case before us, that death was caused by *spasm*, not paralysis, of the heart. The organ shut itself up so closely that not a drop of blood could enter it, and maintained its grip until the *rigor mortis* took its place. There were only slight signs of external spasm, the respiration was unobstructed and continued some time after the heart stopped beating, and yet it would not respond to the usual stimulus of the vital current. The blood was found to be mostly fluid. The poison had entered it and destroyed its normal properties, and the principal instrument in its distribution refused to drive it through the system. This deadly effect on the blood which chloroform produces cannot be too greatly emphasized. The mischief is most radical in its nature, and the entire suspension of the inhaling process cannot undo it in time to avert the danger. We are not aware that any investigations have been made to determine whether sulphuric ether produces any poisonous change in the blood when inhaled. Certain it is no instantaneous death has ever occurred under its use, and the symptoms which it causes diminish from the moment it is withdrawn from the patient.

The second case given by Mr. Huxley is not of recent occurrence, and is not so fully reported, but still possesses much interest.

"The following case, which occurred in this Hospital about three years ago, is subjoined as it was not reported in any medical journal nor sent to the Chloroform Committee:—

"R. G., a very healthy-looking man, aged 33, wished to have chloroform to avoid the pain attending cauterization of a sloughing sore on the penis. One drachm of chloroform by measure was placed in the inhaler, and inhalation commenced. The patient soon became very restless, holding his breath, and trying to avoid the vapor (which was, however, much diluted), so that the larger portion of the chloroform was wasted. He was allowed to sit up to spit, and then a second (measured) drachm of chloroform was put into the instrument; but again he grew turbulent, and struggled so violently that it was found difficult to watch the pulse continuously, though every effort was made to do so. Suddenly he sank back motionless, with dilated pupils, and no trace of pulse to be felt. The inhaler was instantly removed from his face, and he continued to draw deep, gasping breaths for half a minute. Cold splashing was applied, and artificial respiration by the 'Marshall Hall method' was resorted to



without the smallest delay. Ammonia was applied to the nostrils, and subsequently a brandy injection was given, while galvanism and friction were assiduously employed. Pressure over the cardiac region (as suggested by Dr. Brown-Séquard in his lectures at the College of Physicians) was also tried. The artificial breathing was afterwards continued by the 'Sylvester method' for upwards of an hour. No sign of returning animation occurred.

"At the *post-mortem* examination, the heart was found to be of a normal size, the ventricles were partially dilated, and both contained fluid blood. There was no valvular disease. The muscular structure was firm, of good color, and without trace of fatty degeneration. The brain, lungs, and abdominal organs were all carefully examined, but no sign of disease was found, nor was there marked congestion of any organ."

In this case, as in the other, the blood was found fluid, but the heart was not so firmly contracted. The ventricles were not, however, widely distended, as we should have expected if paralysis had arrested their action, but partially dilated, as if spasm might have closed them at first, to be partially overcome by the pressure of the *vis a tergo* of the returning blood.

The third case of death from chloroform occurred in the Commercial Hospital, Cincinnati. The patient was a large, corpulent man, apparently healthy. Chloroform was administered to him without producing any unusual effects until after the surgical operation was concluded. While Dr. Wood, who had done the operation, was addressing the medical class—we quote from the *Cincinnati Lancet and Observer*—"he accidentally looked around and saw the man gasp and that he was suffocating; he immediately withdrew the tongue and the man breathed; waiting until he had drawn ten or more inspirations he again turned to the class, remarking that such circumstances were not unusual, and they must always be on their guard for them. After this he again turned his attention to the man, and saw he was not breathing and was dead. Artificial respiration and other means were used, but did no good. When he turned the second time there was no pulse at the wrist, nor could he feel the heart pulsate; he thought the heart ceased beating at the same time with the respiration, and that neither one had precedence of the other. As to the cause of death, the *post-mortem* reveals nothing, with this exception, that the blood of a person under chloroform is driven from the periphery to the centre, from the meninges to the brain, and that there is great congestion of the nervous system of the head, the blood being driven up to the brain."

In Dr. Taylor's report of the autopsy in this case, made twenty-seven hours after death, it is said that the cavities of the heart were all empty, and the blood was thin, dark-colored, and presenting no coagula. There is good reason then for thinking that in this case, also, death was caused by *spasm* of the heart.

The chloroform in this instance was given in a very unsafe manner, on several folds of muslin, covered with oiled silk, excluding the air as much as possible. It was the usual method of administering this agent in the Commercial Hospital, and chloroform from the same bottle was given with the same apparatus, in the same way, to other patients on the same day, with impunity. It is noticeable that there was

no obstructed respiration by the falling back of the tongue in this instance, or in either of the first two above reported, to which the fatal issue of chloroform cases has been so often attributed.

But we will not pursue this painful subject further. Can any one with his eyes open fail to see, that in spite of the utmost precautions in administering it, with the most careful judgment as to the fitness of the patient for its use, with the purest article that the market affords, anæsthesia from chloroform means imminent danger, deadly peril to the patient?

**MASSACHUSETTS MEDICAL SOCIETY AND REGIMENTAL SURGEONS.**—An article under this caption from the *University Medical and Surgical Journal*, has, we see, been copied into other medical journals, and therefore calls for some comment from us. The article states that no candidate for the post of Surgeon or Assistant Surgeon in the Massachusetts regiments will be examined by the Medical Commission of this State unless he is a member of the State Medical Society. The writer then goes on to vent his righteous indignation on this "studied and persistent conspiracy," as he calls it, and declares that in consequence of it our regiments are often supplied with "inexperienced boys and strolling professional vagrants," to the great injury of our soldiers. We have not a word to say in vindication of our regimental Surgeons or Assistant Surgeons; their record is too clear to need any praise from us. We merely wish to say, that there is not a word of truth in the statement. It is false and libellous from beginning to end. No such test has ever been applied to candidates for examination, and a very large proportion of the medical staff of our regiments are not members of the Massachusetts Medical Society. A journal which claims for itself so emphatically the attribute of independence, should take special pains not to ignore the truth among the influences it despises; an ignorance, however, we are free to confess, our experience has hitherto shown such journals to be particularly chargeable with.

**VITAL STATISTICS OF BOSTON.**  
FOR THE WEEK ENDING SATURDAY, MARCH 4th, 1865.  
DEATHS.

	Males.	Females.	Total.
Deaths during the week	37	48	85
Ave. mortality of corresponding weeks for ten years, 1853—1863,	42.3	41.4	83.7
Average corrected to increased population	00	00	91.56
Death of persons above 90	0	1	1

**PAMPHLETS RECEIVED.**—Ovarian Tumors and their Treatment (excepting ovariectomy). By E. R. Peaslee, M.D., LL.D. Read before the New York Academy of Medicine, March 17th, 1864.—On Ovariectomy: a paper read before the New York Academy of Medicine, June 15th, 1864. By E. R. Peaslee, M.D., LL.D.—Rhode Island Registration Report, 1863.—Report of the Commissioner of Pensions.

**DEATHS IN BOSTON** for the week ending Saturday noon, March 4th, 85. Males, 37—Females, 48.—Abscess, 1—accident, 1—apoplexy, 2—inflammation of the bowels, 1—congestion of the brain, 2—disease of the brain, 3—inflammation of the brain, 1—bronchitis, 3—cancer, 2—consumption, 19—convulsions, 6—croup, 1—debility, 1—diarrhoea, 1—dropsy, 1—dropsy of the brain, 1—dysentery, 1—epilepsy, 1—scarlet fever, 1—typhoid fever, 1— hæmoptysis, 1—disease of the heart, 1—infantile disease, 3—intemperance, 2—disease of the kidneys, 2—congestion of the lungs, 1—inflammation of the lungs, 6—metritis, 1—old age, 2—premature birth, 2—rheumatism, 1—smallpox, 3—syphilis, 1—unknown, 6—whooping cough, 1. Under 5 years of age, 32—between 5 and 20 years, 9—between 20 and 40 years, 21—between 40 and 60 years, 8—above 60 years, 15. Born in the United States, 60—Ireland, 24—other places, 1.